Hampton Roads Datathon 2023 – Project Summaries

1st Place - Team Old Dominion University Business Analytics Club

Bringing Holistic Wellness to Norfolk

Our team has launched an initiative to enhance the wellness of our community through accessible guided walk programs. We aim to support the physical, social, emotional, spiritual, and environmental dimensions of wellness for Norfolk residents.

Weekly walks are held in various neighborhoods, led by trained volunteers. In addition to physical activity, the walks incorporate mindfulness activities, natural settings, and opportunities for community bonding. Participants are also encouraged to connect with their feelings and find inner reflection.

To further extend our reach, we've created Facebook and Messenger platforms where Norfolk residents can learn about upcoming walks, provide feedback, and interact with our team. These channels allow for two-way engagement at scale through advanced AI-powered features.

An interactive Google Map overlaying environmental and community data helps participants plan the safest routes. Integrating crime reports, lighting, tree coverage, and local resources supports safer, more purposeful outdoor experiences.

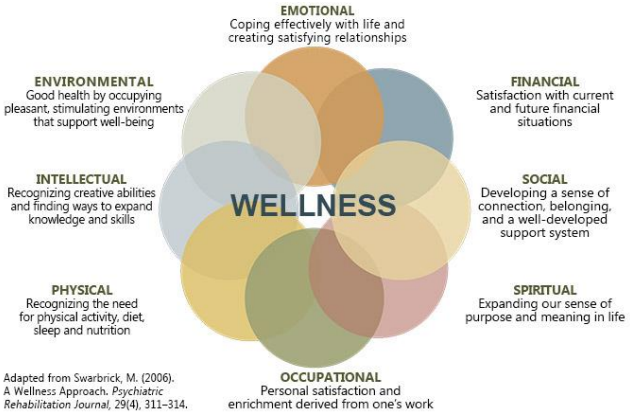
By addressing multiple wellness domains and harnessing digital tools, we aim to make holistic wellness widely attainable. Our approach values every voice in our community.

2nd Place - Team Virginia Modeling and Simulation Center

Census Tract Level Analysis of Behaviors & Practices in Six Domains of Physical Health for Norfolk, VA

Authors: Kevin O'Brien, Virginia Zamponi, Jessica O'Brien, Ross Gore, Christopher J. Lynch, and Erik Jensen

Background: The topic of the Datathon is Community Wellness: analyzing and promoting mental, financial, social, spiritual, occupational, physical, intellectual, and environmental wellness in Hampton Roads. These eight dimensions of wellness were developed by Dr. Margaret Swarbrick and are commonly cited and used in programs focusing on the wellness of individuals and communities. Our team is focusing on the six domains of physical health identified by Dr. Swarbrick.



Data: PLACES is a collaboration between CDC, the Robert Wood Johnson Foundation, and the CDC Foundation. PLACES provides health data for small areas across the country. This allows local health departments and jurisdictions, regardless of population size and rurality, to better understand the burden and geographic distribution of health measures in their areas and assist them in planning public health interventions. PLACES provides model-based, population-level analysis and community estimates of health measures to census tracts in many cities across the United States.

Objective and Method: To understand the Peggy-Swarbrick six domains of physical health at a fine-grained geographic level in Norfolk, VA we analyzed the city's CDC Places Data. We then identified which physical behaviors are highly correlated to different health outcomes to then provide possible recommendations to improve overall health in each of Norfolk's census tracts. To make our findings more accessible, we developed a web-based dashboard. For each census tract in Norfolk, VA the dashboard shows percent of individuals engaging in healthy behaviors in each domain and how that compares to other census tracts: https://vmasc.shinyapps.io/hr-datathon-2023/. Some of the domains, like healthy food choices, are not well represented in the CDC Places data set. To address this limitation, we have created additional data sets and visualized them on an interactive map: https://www.arcgis.com/apps/mapviewer/index.html?webmap=6457bb021ad1422d945ec7f635bc759a.

Recommendations: For each domain we identified multiple changes in behaviors and practices that could improve health outcomes by identifying high correlations between them.

3rd Place – Team Old Dominion University – Data Bridges Global

Story Map for Hampton Roads Wellness Intersectionality Study

Authors: Zlatka Rebolledo Sanchez, Swati Mishra, Amulya Sai Jonnalagadda, Prashant Tomar, and Rohit Chaudhary

The Hampton Roads Wellness Intersectionality Study for the Datathon 2023 delves into the comprehensive analysis of community wellness in the Hampton Roads region. Initially focusing on health and safety, the study evolved to prioritize 66 schools in low-income areas and communities of color. The selection includes 14 private and 52 public schools, distributed across cities based on specific criteria.

To further enhance prioritization, the study incorporates proximity to areas vulnerable to sea-level rise and uses the Normalized Difference Vegetation Index (NDVI) to identify regions with less vegetation. Geospatial analysis and maps are developed to visually represent the suggested areas and the final list of prioritized schools, with a commitment to transparency and public access.

This intersectional approach aims to address disparities and create a more resilient and equitable community wellness framework. The study emphasizes public engagement, recognizing the importance of community involvement in fostering a healthier and more sustainable Hampton Roads.

Recap of Key Findings and Prioritization Criteria: In summarizing our comprehensive study on community wellness in Hampton Roads, several key findings and prioritization criteria emerge as pivotal to our mission:

1. Focus on Disparities:

- The initial analysis highlighted significant disparities in wellness across Hampton Roads communities.

- Prioritization criteria included financial, social, physical, and environmental aspects to address these disparities comprehensively.

2. School Prioritization:

- A critical decision was made to prioritize schools in low-income areas and communities with a higher population of people of color.

- The resulting list comprises 66 schools, balancing between 14 private and 52 public institutions.

3. City Distribution:

- The distribution of prioritized schools across cities is as follows: Norfolk (26), Portsmouth (12), Newport News (10), Hampton (9), Chesapeake (7), and Suffolk (2).

- This strategic distribution aims to maximize impact across diverse urban landscapes.

4. Enhanced Prioritization Criteria:

- Beyond socio-economic factors, further prioritization considers schools' proximity to areas vulnerable to sea-level rise.

- The incorporation of the Normalized Difference Vegetation Index (NDVI) refines prioritization based on environmental considerations.

5. Geospatial Mapping:

- Geospatial maps visually represent the identified areas and prioritized schools, providing a clear guide for future initiatives.

- Transparency in mapping ensures accessibility for both the public and stakeholders.

Potential Impact on Community Wellness in Hampton Roads: The implications of our findings and prioritization criteria extend far beyond data points and maps; they underscore a transformative potential for community wellness in Hampton Roads.

1. Equitable Access to Wellness Resources:

- By targeting schools in low-income areas and communities of color, our approach seeks to bridge the gap in access to wellness resources, fostering a more equitable distribution.

2. Resilience Against Environmental Challenges:

- Prioritizing schools in proximity to areas vulnerable to sea-level rise anticipates future challenges, instilling resilience within communities and educational institutions.

3. Green Infrastructure Initiatives:

- Encouraging communities and schools to apply for funding, especially through programs like the Retain Your Rain Mini-Grant, facilitates the creation of green infrastructure projects, positively impacting environmental and physical wellness.

4. Community Engagement and Collaboration:

- The study actively encourages community engagement, emphasizing that collective efforts are pivotal for sustained improvements.

- Collaboration with organizations willing to support community initiatives further enhances the potential for positive change.

5. Holistic Wellness Approach:

- By considering financial, social, physical, and environmental factors, our approach takes a holistic view of community wellness, recognizing the interconnectedness of these elements.

In conclusion, the Hampton Roads Wellness Intersectionality Study not only identifies areas of concern but, more importantly, provides a roadmap for actionable change. Through targeted initiatives, community engagement, and a commitment to equity, we envision a future where Hampton Roads residents experience improved wellness across all facets of their lives.

Link to the story map and web maps:
https://storymaps.arcgis.com/stories/859f4fe24b6d4b17a06162922f66b7f6

Team Hampton Roads Sanitation District

Hampton Roads Sanitation District (HRSD) worked on visualizing COVID Wastewater Surveillance. Though the data is readily available from the Virginia Department of Health (VDH), we believed that it was possible to visualize the data in a different way. The existing data is displayed on a map as dots that represent sewersheds, or treatment plant service areas. Our goal was to represent the real sewershed boundary, along with the COVID viral load from our wastewater surveillance over time. With the two datasets and the sewershed boundaries visible within an ArcGIS Online dashboard, trends could be displayed alongside each other, helping to possibly predict when a new outbreak occurs.

Dashboard - 2023 Datathon - Dashboard (arcgis.com)

Team City of Norfolk Department of Housing and Community Development

Norfolk Financial Wellness Center

Authors: Amena Anderson, Ha Chau, Irric Apolonio, Raquel Amarins

Financial Wellness is a state of being in which you can fully meet your current and future financial obligations while feeling secure in your financial future and making choices that allow you to enjoy life (source, Federal Reserve).

In this exercise, the team analyzed several datasets and data reports to bring you **Steve**. Our character intends to be a portrait of the average adult struggling with debt, lack of savings, and an uncertain future.

Our main datasets were the 2020 Census, the 2022 Survey of Households Economics and Decisionmaking (SHED), and Greater Hampton Roads Connects. Steve's income represents the lowest median household income by race and ethnicity in Hampton Roads. Additionally, he falls into the group who spends 30% or more of income on housing. Mirroring nearly a quarter of Americans, Steve has no savings, and struggles with debt.

Our team wanted to highlight the importance of having support towards reaching Financial Wellness. That's where the Financial Wellness Center comes in play. These Centers are dedicated to walk alongside participants in their journey, and are proven to be responsible for increasing the success rate of those willing to achieve financial freedom.

Since local data related to financial literacy program participation is extremely limited, we based our premise that Steve would be successful in his endeavor after regularly visiting a Financial Wellness Center and following their program. What does it look like when the path opens up? No need to guess – data shows that savings are at the heart of getting out of debt, being able to deal with emergencies, save for a house, and retire more comfortably.

Remarkably, almost half of the U.S. households don't have an emergency fund and are not able to cope with a $400 last minute emergency. By learning about bank rates and budgeting, Steve takes one step closer to be out of debt, while saving to buy a house. From there, Steve's future looks brighter and brighter: his choices may allow him to retire on an income almost 10 times more than the average American depending on Social Security alone.

We hope that you enjoyed Steve's journey! We believe that a Financial Wellness Center would be a great investment to the area. In addition, a Center would collect valuable data on financial health from participants, which could be used to improve policies and processes.

Team Hampton Roads Planning District Commission

Introduction: From Gen Z to Gen Alpha, how is Hampton Roads doing to serve our youngest residents? Our children are our future, so are we supporting their needs in an ever-changing world? Do they have the necessary resources to grow, learn, and thrive? According to the National Institute of Health (NIH), supporting wellness for kids of all ages can be reflected in a few basic considerations: promote physical activity, be aware of technology time, foster positive relationships, acknowledge the importance of sleep, and build resilience.

We can't tackle all aspects of childhood wellness, but we can focus on the strengths that make Hampton Roads unique. With a mild climate, there's plenty of time to get outdoors, so proximity to playgrounds, sports fields, and rec centers could be crucial for **physical wellness**. According to the latest research, up to 20% of our youth are impacted by obesity, which varies by demographics. Being active and ensuring our youth have access to facilities that promote physical well-being is vital.

Access to technology and educational materials outside of the school building is also important in promoting **intellectual wellness** by identifying proximity to libraries. Not only do libraries promote and develop good reading habits in children, they also provide a variety of services. Through summer reading programs, access to technology, and social services, libraries encourage and empower children to embrace books and provide life-long educational skills.

And since we are a region surrounded by water, identifying access to overlooks and vistas, fishing, and swimming opportunities were also considered for **environmental and mental wellness**. As the region comes out of the COVID-19 pandemic, more and more research shows that kids need time spent outside to reduce stress and promote happiness.

In Hampton Roads, there is access to all types of amenities, but are they in the right places? Can kids find easy, free access to playgrounds, sports fields, libraries with books and technology, fishing, swimming, and nature trails? Through data analysis, we can try to identify where we're currently doing a good job promoting childhood wellness and where there's an opportunity to do more.

Methods: An inventory of publicly available data was compiled, including playgrounds, parks that include sports fields, recreation centers including YMCAs, libraries, and overlooks, fishing, and swimming opportunities. These point data were then mapped and compared along demographics for ages 0 – 17 across the region. Data were then analyzed by census block group to determine the density of youth populations in relation to the density of available resources. A bivariate map was created to highlight areas with high or low areas of percent youth population and resource density.

Results: Analyses show that 22% of Hampton Roads residents are under 17 years old. Of the 1,253 census block groups in the region, 2.3% don't have any youth residents (military, industrial areas, etc.). There are 1,469 total resources identified in the region, with schools and libraries the most predominant (Fig. 1). The bivariate analysis showed a range of accessible resources across the region (Fig. 2). There were 546 census block groups without any resources; representing 38% of the region's youth population. These are mainly concentrated in the rural, western portion of Hampton Roads. Fifty-eight (58) census block groups had a high percent youth population and high resource density, representing just 5.5% of the region's youth population. These areas were concentrated in the more urban portions of the peninsula and southside. Walkability to resources was explored by applying a 1- mile buffer around resource locations (Fig. 3).

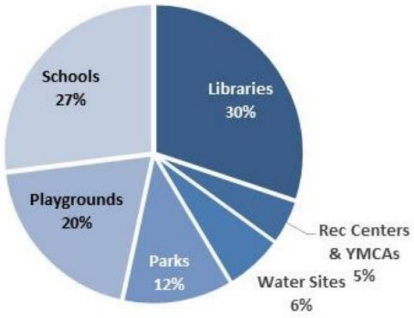


Figure 1. Percent of youth resources throughout the region.

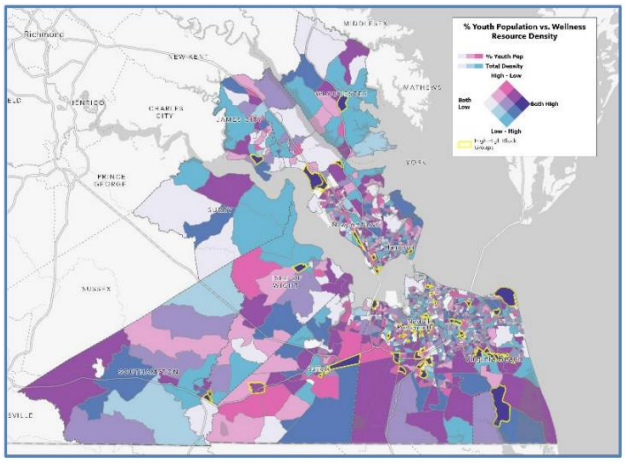


Figure 2. A bivariate map of percent youth population versus wellness resource density. Dark purple (outlined in yellow) census block groups indicate high percent youth population and high wellness resource density.

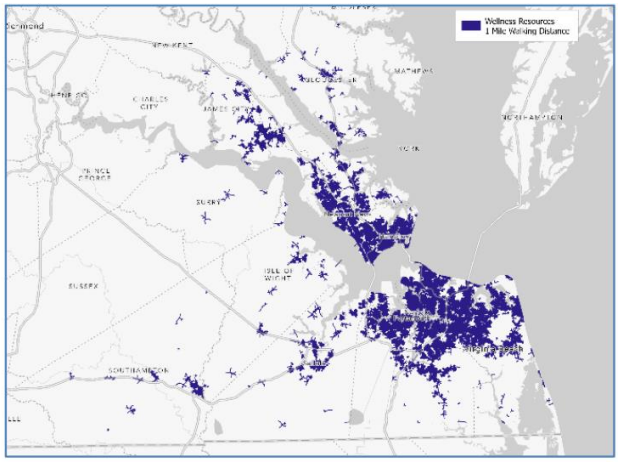


Figure 3. The dark purple areas indicate the accessible zones for the youth population to access the wellness resources within a 1-mile walking distance.

Conclusion and Next Steps: We couldn't look at all aspects of youth wellness, so further work could investigate the availability of quality of public education, access to free healthcare, air quality, environmental justice considerations, screen time, and other factors impacting wellness. Creating awareness of the wellness opportunities available to the region's youth could lead to the formation of Youth Wellness Hubs, like those created in Ontario, Canada, or Community Wellness Hubs, as recommended by the National Recreation and Park Association (NRPA). Services can be made available in hubs in any region to provide wellness opportunities in one strategic location to meet the needs of the youth in their community.

Acknowledging that these types of resources are difficult and expensive to build, creative solutions can be considered to address observed gaps. For example, school districts could

expand after-school programs, localities can increase access to mobile libraries, or identify small parcels for pocket parks. Communities lacking resources within walking distance can also consider developing alternative programs to improve access. Mobile libraries and transportation programs, like those provided by The Seattle Public Library, are options to creatively address access challenges. Programs providing equitable access to wellness resources may be especially important in rural communities where there is a more significant challenge to siting facilities within walking distance of youth populations.

Data Sources:

- Hampton Roads Public Parks, HRGEO
- Hampton Roads Public Water Access, HRGEO
- Hampton Roads K-12 Schools, HRGEO
- Virginia Public Libraries, VGIN
- Recreation Centers/YMCAs, compiled by HRPDC via web research
- US Census 2021 5-Year ACS (Census Block Group) – Population, Youth Population

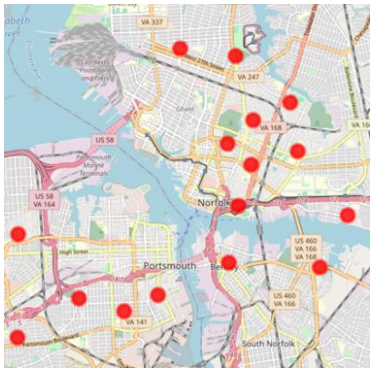
Team Eastern Virginia Medical School – RISE

Insufficient Sleep and Implications for Community Health in Hampton Roads

Authors: Fang Fang PhD, Marilyn Bartholmae PhD, Michael Bittner MPH, Matt Karpov MPH, Miasha O'Neal MPH Research & Infrastructure Service Enterprise (RISE), EVMS (RISE@evms.edu)

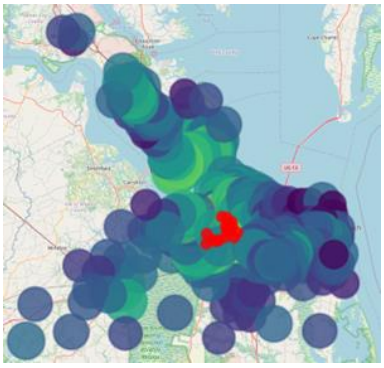
Background and Significance: Good sleep is necessary for good physical and mental health and a good quality of life. Insufficient sleep is a pervasive and prominent problem in modern society. Approximately 33% of adults in the U.S. do not get at least **seven hours of sleep**, the CDC recommended amount of sleep time for adults within a 24-hour period. Insufficient sleep is negatively associated with individual wellness, including adverse health outcomes and poor performance at school and in the labor market. As an important public health issue, we want to understand the prevalence of insufficient sleep and what can be done to mitigate the negative impact on community wellness.

Data: We utilized data from the 2020 CDC Behavioral Risk Factor Surveillance System (BRFSS), the U.S. Census 2015-2020 American Community Survey (ACS), EPA Community EnviorAtlas of Virginia Beach/Williamsburg, VA and Vicinity, and Virginia Department of Criminal Justice Service. 359 neighborhoods (based on census tract) from 9 cities, **Norfolk, Virginia Beach, Chesapeake, Portsmouth, Suffolk, Hampton, Newport News, Williamsburg, and Poquoson** were included for analysis.



Hotspots of Insufficient Sleep in Hampton Roads: Hotspots refer to neighborhoods with unusually high prevalence of insufficient sleep (% of residents in the neighborhood who do not have sufficient sleep is two standardize deviations higher than the mean).

Precursors and Outcomes of Insufficient Sleep: Several precursors of insufficient sleep have been studied, including violent crime rate, crowded housing, greenspace in the neighborhood, and physical activity. Race and ethnicity also seem to have a correlation with poor sleep, as people from racial/ethnic minority groups appear to have a higher prevalence of insufficient sleep. Numerous negative health outcomes can occur as results of poor sleep and justify the need for interventions. These include coronary heart disease, stroke, obesity, and depression in Hampton Roads.



Conclusion: These 9 cities in Hampton Roads have significantly higher prevalence of insufficient sleep than the national average and the state average. Insufficient sleep and related sleep disorders have been considered as serious public health issues. However, they are preventable. Having a comfortable living environment, such as sufficient greenspace in the neighborhood and safe community, which are also conducive to physical activities and exercise, may reduce the prevalence of sleep problems and is beneficial for better community health. Overall, our findings suggest that efforts on improving environmental and social wellness would likely lead to favorable outcomes of physical and mental wellness. An integrative approach to address issues that can link each component of community wellness is recommended.

Team City of Norfolk CivicLab

Public Restroom Access in Norfolk, VA

Purpose: The purpose of this project was to gather information on the location, accessibility, and facility characteristics of public restrooms within the city of Norfolk. This effort acted as the initial step towards future data decision making to strategically improve access to public restrooms.

Background: A public restroom, by definition, is a room or small building equipped with toilets and sinks for use by the public. Public restrooms are typically found in many different locations throughout the city of Norfolk and include community parks, community centers, special event parks, libraries, beaches, and other places where the public is expected to gather on a regular basis.

Process: In this report we presented our process by establishing a citywide database of publicly accessible restrooms. Data collection was challenging as we were unable to identify a reliable single source of public restroom distribution and had to pull information from multiple sources. The source data lacked facility feature detail (hours of operation, Americans with Disabilities Access, gender neutral accessibility, etc.). As a proof of concept, team members visited a sample of the public facilities to collect basic facility feature information for project purposes.

Findings: Information provided in this project include a visual representation of the distribution of the 43 public restrooms across the city of Norfolk at various geographic units to include City-wide, Ward, Superward, and census tract levels.

Conclusion - Next Steps: Recommended future phases and next steps include additional research and efforts in the following areas:

- Coordination within city departments to identify key stake holders and establish responsibility regarding of the various parts of this process.
- Completion of a comprehensive public restroom field infrastructure assessment to audit public restroom quality and accessibility.
- Implementation of a social survey to gather experiences and perspectives of public restroom reliant individuals.